PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04M 3/42, H04Q 3/64, 3/00 — A1

(11) International Publication Number: **WO 98/44706**

(43) International Publication Date: 8 October 1998 (08.10.98)

(21) International Application Number: PCT/SE98/00570

(22) International Filing Date: 27 March 1998 (27.03.98)

(30) Priority Data:
9701206-6 27 March 1997 (27.03.97) SE

(71) Applicant: TELIA AB (publ) [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).

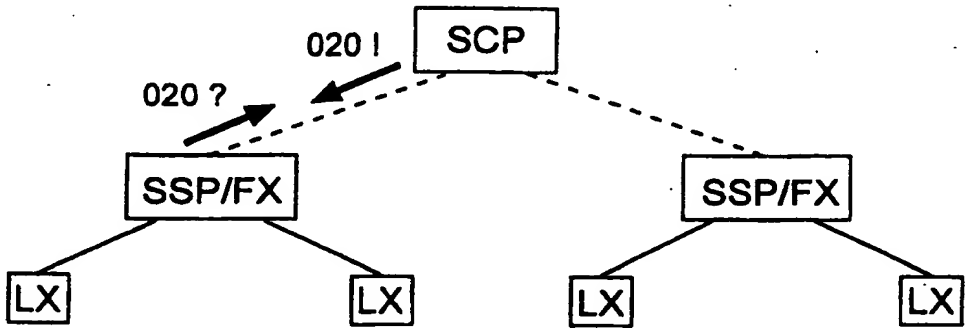
(72) Inventor: EIDE, Rune; Slånbärsvägen 7, S-393 58 Kalmar (SE).

(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).

(81) Designated States: EE, LT, LV, NO, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: TELECOMMUNICATIONS NETWORK



(57) Abstract

Telecommunications network including subscriber equipment by which a subscriber can be provided telecommunications services from the network (via an operator), and one or more units with control logic/control functions (SPP;SCP) which are located in the network and which execute telecommunications services in cooperation with the subscriber equipment. The units with control logic/control function are located in an IN-platform and consist of conventional SPPs and SCPs and a special computer SCP2 which contains logic for call control arranged in an architecture where the call management is executed in the conventional SCPs and where ACD (the call control) is executed in said public SCP2 and that the communication with the client applications of the subscriber equipment is executed via transparent signalling between SCP2 and the client applications.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

TITLE OF THE INVENTION: TELECOMMUNICATIONS NETWORK

TECHNICAL FIELD

Telecommunications network including subscriber equipment by which a subscriber can be provided telecommunications services from the network (via an operator) and one or more units with control logic/control functions (SPP;SCP) which are located in the network and which execute telecommunications services in cooperation with the subscriber equipment.

PRIOR ART

Companies and organizations in branches where one communicates with the customers by means of telephone are today working hard to increase the efficiency and the quality in the treatment of the customers. A strong trend is that telephony- and computer systems are being integrated in order to reach this aim.

In Sweden we have a long tradition of local attendance in many branches. People´s demand for flexibility also results in that many activities which previously have been centralized, are becoming more and more decentralized. This also makes demands for geographically free system solutions.

Another pronounced trend is that companies want to focus on their "core activities", and by that the interest in out-surcing and purchasing of functions has increased.

A number of years ago the main task for the telecommunications network was to handle calls between subscribers. Today almost all old technology in the telecommunications network has been replaced by modern computer technology with a special architecture which is called IN-technology (Intelligent Network services).

IN utilizes an existing network, but is logically separated from this. By logically separated is meant that IN has a network structure of its own which is located "on top of" the telecommunications network. The communication between nodes in IN is executed with regard to the physical connections the telecommuncations network offers. All this implies that IN is independent of the network on which it is operating. It doesn't matter whether the underlying network is broadband, ISDN, or a packet network. IN, consequently, can be said to be independent on which access network one in the actual case is making use of.

The reason for the development of IN was on one hand that the operator should have possibility to develop own competitive services with own specific technical solutions in order to optimally utilize the existing network, and on the other that the market demanded a development of services to achieve a better extent of utilization of the capacity in the existing networks. The integration of telephony- and computer systems makes great demands on the structure and the communication between the in the telephone network existing equipment and the user's equipment.

Further is shown by the document WO,A1,95/04 436 a way to communicate data between two network terminations without the need to set up a call.

TECHNICAL PROBLEM

A superior problem at the present invention is to create a more efficient system structure for computer-telephony solution for geographically distributed activities, and at the same time use the in the network existing IN-

architecture in a more supple way resulting in a more efficient control of the calls, and that its realization is made in the public network.

ACD - or Automatic Call Distribution - is a telecommunications service which has existed in the digital PABXes (Private Automatic Branch Exchange) for many years, where calls are distributed automatically in an "intelligent" way. ACD is also used as a concept for all handling of calls in a so called Call Center, i.e. a place where one has a great concentration of incoming and/or outgoing telephone traffic (booking center, telephone sales, etc). All companies actually want to handle all incoming calls, and handle these in an optimal way (all calls being answered, and answered by right person). This, however, is not possible in all situations. The reasons for this is that there are variations in traffic intensity, and that not all administrative officials manage to handle all types of matters, or that certain administrative officials also have other tasks than answering telephone calls. Handling of incoming telephone traffic can be seen as a number of problems according to the following:

1. There momentarily can be more incoming calls than can be handled.
2. There permanently can be more incoming calls than can be handled.
3. The administrative officials can not handle all types of matters.
4. The administrative officials who handle a type of matter are not equally suitable for this.
5. All administrative officials are not in the same physical working place.
6. Administrative officials can be located outside the company, for instance at home.

Another problem is that an ACD which shall cover all geographical places, equipments and network connections of an organization is not possible with the present ACD-technology which is restricted by the mentioned factors. The previous solutions do not use IN-technology but PABX-connection to the network to effect ideal ACDs.

TECHNICAL SOLUTION

The technical solution is specified in the patent claims.

ADVANTAGES

By the present invention the public telecommunications network is improved and made more customer adapted.

Further is by the invention a solution created which gives new possibilities to create new cost efficient computer-telephony solutions for geographically distributed activities.

- Calls can be distributed to answering positions for different places.
- Efficient call control - all staff in a distributed organization can receive calls.
- Computer integrated telephony - customer information can be presented to the person in charge of a matter before the call is answered.
- Supervision and statistical functions make possible efficient staff management and planning of activities.
- Cost connected to service content and amount of traffic.

DESCRIPTION OF FIGURE

Figure 1 shows the prior art.

Figure 2 shows the system solution according to the invention.

DETAILED DESCRIPTION

In order to facilitate the understanding of the present invention, explanations of the used abbreviations are given below.

SSP: Common (ordinary) SSP.

SCP: Conventional SCP based on AXE-10.

AST-DR: Conventional recorded announcement machine for playing of phrases. Is here used for playing of general messages, addresses of welcome, menu trees, and for reception of DTMF-figures from the A-subscriber.

SCP2: General Unix-computer which is both an SDP and an SCP2.

IV: Infovox 3000 is used as message server; stores and plays messages which the callers can give if a) they choose to do it because the queue is regarded to be too long, or b) if selected function or the whole service is closed.

RAS: A Remote Access Server which is used to transport signal information from the operators' terminals to the LAN backbone of the SCP2 if a router connection is not cost efficient. Can be used for both modems and ISDN-connections.

RT: IP-router which is used to transport signal information from the operators' terminals to the LAN backbone of SCP2 when there are a lot of operators in the same place and/or if the customer already has a WAN-infrastructure for his/her terminals.

DB: The customer´s database/application server which "talks" with the OP-applications via a DDE-interface, not necessary for the service to function.

PASTEL: Telephony hardware which supports TAPI; all hardware with TAPI-support can be used.

Modem: It is used for distributed workplaces, also ISDN can be used when suitable hardware exists.

Freephone (access number usually 020) is often a basic component to build up a call center, telephone based customer service. Freephone makes it possible to have one single number to a multiple of answering positions. This fact, and that one calls free of charge to freephone, facilitates the communication for a call center. In freephone one can, by a number of network control functions, route calls to a freephone number to a number of different answering positions which results in that companies which have the number can utilize their resources (staff, equipment) more efficiently.

In the network today the freephone logic is controlled from a pair of SCPs which communicate with SSP which is on transit level in the network.

In Figure 1 is shown the today prevailing solution for freephones; a subscriber calls a 020-number at which the local exchange recognizes that it is a freephone call and forwards connection of the call to the SSP of the transit exchange, which questions SCP where to forward the call. In SCP there then is a program which is written explicitly for the service in question, with control parameters which for instance depend on the geogaphical position, time, call distribution, load etc. The IN-solution of today is built for the services which have been developed "once and for

all", and not for services which are changed for instance 37 times in 24 hours. This solution is to its nature very static.

Depending on how these control parameters are adjusted, or preprogrammed, for the customer who subscribes to the call center service, the call is forwarded.

The call can for instance be connected to a PBX located at for instance a telephone bank which has connected the administrative support system of its company to said PBX. This results in that one can connect call and display image, with data about the one who is calling, to the operator who answers the call, who then also has the data information accessible.

By the invention, see Figure 2, is shown an architecture or system solution for an automatic answer management which gives a greater flexibility, customer control and status - and statistical information. As can be seen in the Figure, a general computer SCP2 is connected to an SCP (which may be a conventional SCP in the network today). These computers are connected to each other via an INAP protocol. We consequently has a solution where ACD-logic is introduced into an ACD-server and the call management in IN (SCP), at which the communication is made via transparent signalling between ACD-server and the client applications.

A subsciber who calls a company (which is in possession of this service) usually has a number of questions which he/she wants to have answered in best possible way. The company can optimize this by causing the customer to speak to "right" person. Who is right person often can not be found from the information one has about the call before this has been answered. It therefore is suitable to divide the administrative officials of the company in "sections" (ACD-groups) which corresponds to the most important needs

of the customers and who it is possible to sort out before the call has been answered.

The information one has about the call before it is answered is:

- A-number; the telephone from which the customer is calling.
- B-number; which number he/she has dialled.
- Reception area; where is the customer geographically.
- Time/Date/Day of the week etc.
- Which branches has he/she visited in the voice menu.
- Which codes has he/she entered by keys in the voice menu.

In addition, one has in the ACD-service knowledge about

- Which administrative officials are logged in and ready to receive calls.
- Which groups are opened for traffic.
- Which groups do the different administrative officials serve, and in which priority do they take calls from different groups.
- etc

All, or parts, of this can be used to distribute calls on groups. The groups therefore must be selected according to how they can be distinguished. This can vary between different companies.

The service ACD has four interfaces towards the customers.

The customer´s customer, the one who is calling the service, has an interface via telephone which consists of keying and interactive recorded announcements.

The customer´s administrative officials/operators can be connected via a) an ordinary telephone, or b) be connected to the service via a graphic user interface of a computer.

The customer´s chief operator is always connected via a computer with a data communication link to the service.

The following will happen in chronological order when a customer makes a call to a company which subscribes to the ACD-service:

The call is detected as an IN-call and an inquiry is sent to SCP about where to route the call. SCP detects that this is a call to the ACD-service, plays a message of welcome, if any, ("Welcome to Future Journeys") and a menu, if any, ("For international journeys, press 1; For domestic journeys, press 2; If you are a VIP-customer, press 3 etc) receives all key-enterings made by the customer, parks the call temporary and asks SCP2 about what to do.

In SCP2 the call is identified as call to a customer's ACD and a distribution to right answering group (ACD-group) is made according to one or more of following alternatives:

- The reception area the call is coming from (with regard to A-number);
- Time of the 24-hour period, and/or date.
- Depending on identification which the customer is giving via voice menus.
- Based on the called number or parts of this.
- Based on load distribution between ACD-groups.

In a voice menu one can in addition let a customer chose to:

- Wait in queue, with not replaced handset.
- Give A-number (if not ANI)
- Give a recorded speech and replace the handset; the ACD-operator then can call when he/she will have time.
- Become connected to the company's telephone operator.

While queuing, the customer is continuously informed about that he/she is queuing. When an operator is free in selected ACD-group (queue), the call will be established.

If there is no queuing to the ACD-group, but instead a number of available operators, one of them is selected according to not occupied time, load index or priority towards other operators.

The operator's task is to serve (answer calls from) the ACD-groups he/she belongs to, according to the chief operator's configuration.

There are in the prototype two main variants for connection of operators:

1) PC-operator; ACD-operator with PC who signals by the service; and
2) DTMF-operator; ACD-operator with only an ordinary analog telephone with DTMF.

The optimal for an operator is a PC workplace (PC-operator). Then one can benefit from all advanced functions the service can offer, and get full survey over status of the service, groups and operators (not least one's own status).

DTMF-telephone can be utilized (DTMF-operator), but is only an alternative for customers who only want to utilize the simplest functions in the ACD-service, or who want to use ACD as an advanced Call-Pickup, calling around etc.

The PC-operator has a workplace consisting of following:

Standard PC (Windows) with modem/PSTN-card/ISDN-card, telephone/earpiece and the operator application "OP".

When the operator starts the operator application (OP), or from this wants to log in, a dialog square is presented which asks for user-ID and password.

After a succeeded log in towards the service, the operator can work with the operator application.

An important part of the ACD-service which is located in SCP2 is that the customer's operators and chief operators

can get information about status changes. This is status of number of incoming calls, calls in progress, queuing calls, queuing times, status of operators (how many are active, who do now serve which ACD-groups, status of ACD-groups etc). This status information is important in a distributed ACD where the operators are not sitting in the same room, are belonging to different groups etc. The importance of information will increase by the use of sophisticated algorithms for who are members of ACD-groups, thresholds, auto-login, priorities etc.

This status information is collected and signalled to operators and chief operators. This is done by SCP2 containing powerful algorithms and data structures.

SCP2 communicates with the operator terminals (in form of PCs) via standardized WAN-protocols.

The operator terminals in their turn control the telephone connection via the industrial standard TAPI and communicate with the ACD-functions in SCP2 via a Telia-specific protocol on WAN.

The communication with SCP from SCP2 is executed by an update signal. Consequently one has asynchronous, bi-directional, communication between SCP and external computer.

The communication with SCP can be executed from external equipment via update signal asynchronously in both directions with service unique application protocol pigg-back in the update signal.

Communication Operator terminal - SCP2.

The WAN-connection between OP and SCP2 can be implemented by different carriers. This link is based on standard communication protocol (TCP/IP) and on standard access in the customer computers (WinSocket). What we have done in

the ACD-service is to use exactly the same software as the de-facto standard in the computer industry for WAN-communication, which results in that all ways to connect a computer to Internet/Intranet can be used to connect a computer to ACD. If the company has a LAN, the computers can be connected via this, a remote workplace can be connected via RAS-technology via modem or ISDN. The signalling can go via public data networks, private data networks, or entirely in Telia´s infrastructure (for instance TIPNet). A workplace which is connected to a PABX with digital line card can use the data channel in this to transmit this information.

It can be argued that this signalling cannot be used in a public network (security) or in a packet network (no guarantee for when packets are delivered), and if this results in that such solutions cannot be made, solutions can be made under private management without the architecture being changed.

The most elegant solution of this is to use ISDN with transparent signalling on the D-channel. If one packets TAPI with ISDN duo, one has a complete packet with CTI which can be used both at offices, at home and in distributerd workplaces, for CTI-connection to all IN-services, etc.

Client softwares based (operator and chief operator) on TAPI (Telephony Application Programming Interace) implies that one builds on an open architecture which is supported by all suppliers and operators. TAPI is an open architecture for CTI which gives possibilities to bulid in any services one wants, without this infringing on the standard. That is, one can build TAPI-support for one´s services without this influencing the software of other

suppliers; a telephone selling program from "SelOnTel Ltd" can be run on the same machine as ACD OP with the same telephone hardware without problems.

The TAPI-architecture results in that one provides a clear interface (TAPI) for what is one's own system, and what is the customer's; this means that one can sell telephone applications with telephone support (such as ACD) without knowing what the customer's data system looks like, or that changes are needed in this to make the system work.

The invention is only limited to what is indicated in the patent claims, so the idea of invention is applicable to all types of communication services which get their realization in the network.

PATENT CLAIMS

1. Telecommunications network including subscriber equipment by which a subscriber can be provided telecommunications services from the network (via an operator), and one or more units with control logic/control function (SPP; SCP) which are located in the network and which execute telecommunications services i cooperation with the subscriber equipment, c h a r a c t e r i z e d in that the units with control logic/control function are located in an IN-platform and consist of conventional SPPs and SCPs and a special computer SCP2 which contains logic for call control arranged in an architecture where the call management is executed in the conventional SCPs and where ACD (the call control) is executed in said public SCP2 and that the communication with the client applications of the subscriber equipment is executed via transparent signalling between SCP2 and the client applications.

2. Telecommunications network according to patent claim 1, c h a r a c t e r i z e d in that SCP2 consists of a conventional computer.

3. Telecommunications network according to patent claim 2, c h a r a c t e r i z e d in that the subscriber´s computer equipment cooperates with SCP2.

4. Telecommunications network according to patent claim 3, c h a r a c t e r i z e d in that unit which contains control logic/control function consists of an SSN (Stand alone Service Node).

5. Telecommunications network according to patent claim 2, c h a r a c t e r i z e d in that the telecommunications service is dynamically changeable from the subscriber equipment.

6. Telecommunications network according to patent claim 1, c h a r a c t e r i z e d in that the customer´s operators from SCP2 kan get information about status changes, such as number of incoming calls, number of calls in progrss, number of queuing calls, queuing times, status of operators etc, which together with normal call information gives a more efficient call control.

7. Telecommunications network according to any of the previous patent claims, c h a r a c t e r i z e d in that the operators´ working tools consist of computers.

8. Telecommunications network according to any of the previous patent claims, c h a r a c t e r i z e d in that the operators´ working tools consist of conventional telephones.

9. Telecommunications network according to any of the previous patent claims, c h a r a c t e r i z e d in that SCP2 communicates with the operator terminals (in form of PCs) via standardized WAN-protocols, and the operator terminals in their turn control the telephone connection via the industrial standard TAPI and communicate with the ACD-functions in SCP2 via a Telia-specific protocol on WAN.

10. Telecommunications network according to any of the previous patent claims, c h a r a c t e r i z e d in using ISDN with transparent signalling on the D-channel.

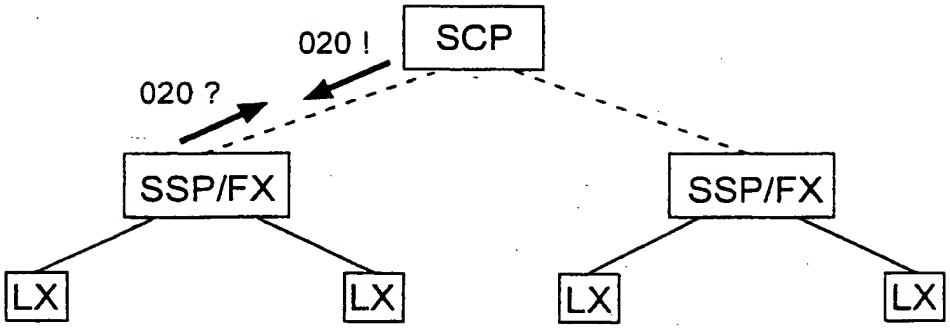


Figure 1

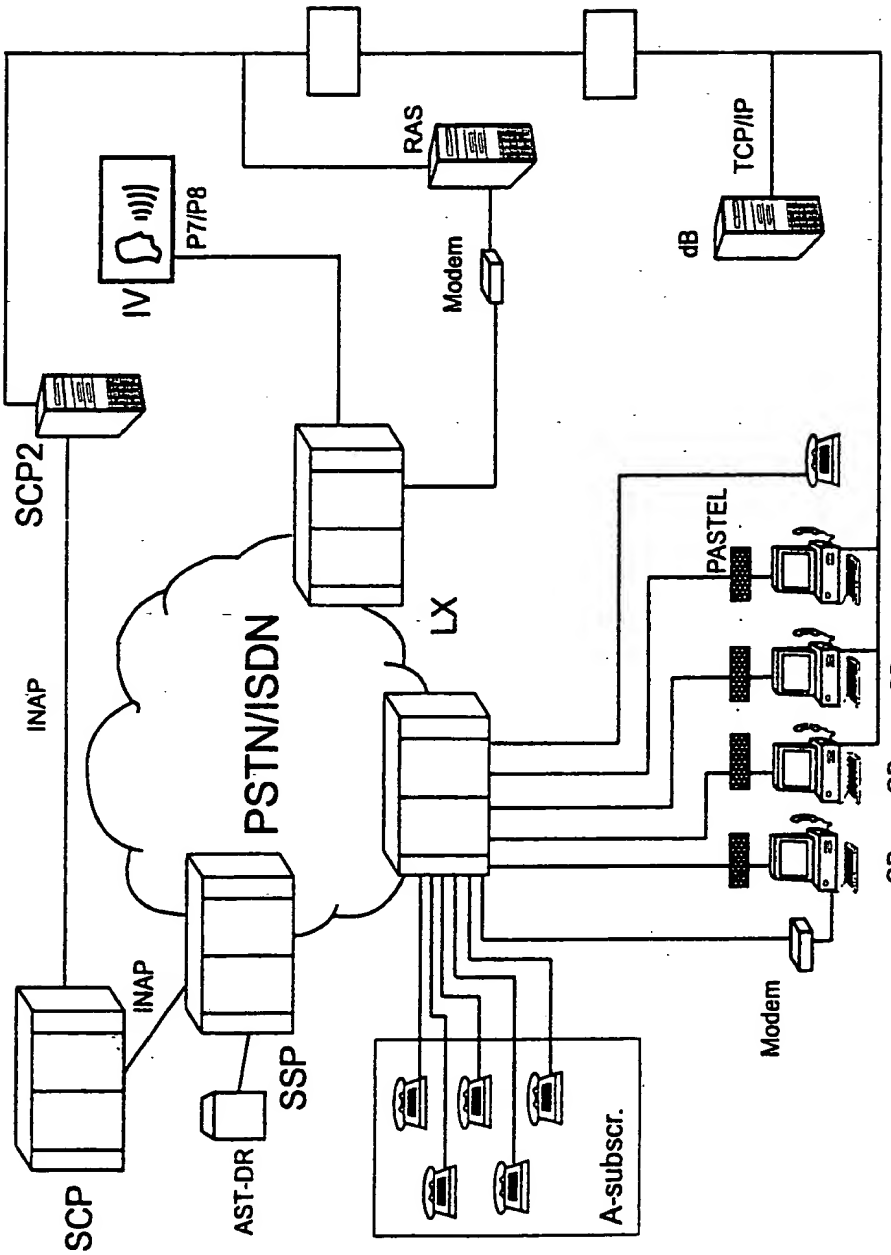

RAS
TCP/IP
P7/P8
IV
Modem
dB
SCP2
PASTEL
OP
OP
OP
OP
LX
INAP
PSTN/ISDN
INAP
SSP
Modem
SCP
AST-DR
A-subscr.

Figure 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 98/00570

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04M 3/42, H04Q 3/64, H04Q 3/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q, H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5452350 A (HENRY S. REYNOLDS ET AL), 19 Sept 1995 (19.09.95), figure 1, abstract --	1-10
A	US 5461669 A (BERNARD VILAIN), 24 October 1995 (24.10.95), column 6, line 67 - column 7, line 17 --	1-10
A	US 5694463 A (JOSEPH MICHAEL CHRISTIE ET AL), 2 December 1997 (02.12.97), column 4, line 18 - column 5, line 9 --	1-10
A	EP 0762784 A2 (ALCATEL SEL AKTIENGESELLSCHAFT), 12 March 1997 (12.03.97), abstract --	1-10

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of ahother citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 July 1998	21 -07- 1998
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Friedrich Kühn Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 98/00570

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,A	EP 0804044 A1 (SIEMENS AKTIENGESELLSCHAFT), 29 October 1997 (29.10.97), see the whole document -- --------	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/06/98

International application No.
PCT/SE 98/00570

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5452350 A	19/09/95	EP 0559979 A	15/09/93
		US 5768360 A	16/06/98
US 5461669 A	24/10/95	AU 665099 B	14/12/95
		AU 4204493 A	03/02/94
		CA 2101459 A	30/01/94
		EP 0583190 A	16/02/94
		FR 2694466 A,B	04/02/94
		JP 6169479 A	14/06/94
US 5694463 A	02/12/97	NONE	
EP 0762784 A2	12/03/97	CA 2184106 A	03/03/97
		DE 19532490 A	06/03/97
		JP 9168056 A	24/06/97
		US 5748710 A	05/05/98
EP 0804044 A1	29/10/97	NONE	